The line as force : Henry van de Velde's scientific approach to artistic problems

von Orelli-Messerli, Barbara

Lines, Forces and Modernities

Barbara von Orelli-Messerli

The line as force

Henry van de Velde's scientific approach to artistic problems

Abstract: The artistic and art historical discourse concerning the line in design can be traced back to Renaissance and the antithetic positions of *disegno* vs. *colorito*. It is Robert William who pointed out that this idea, more dichotomy than antinomy, started in Early Renaissance and that drawing – in our context that means line – was the origin for all arts, be it painting, sculpture or architecture. In the beginning of the twentieth century, Henry van de Velde insisted on the necessity of a theory of the line, having Michel Eugène Chevreul's theory of colours in the back of his mind and postulating in an axionomical way that the line is a force, certainly not forgetting the powerful designs of a Michelangelo Buonarotti in particular and the Florentine style in general. Whereas artists like Henry van de Velde were already at the beginning of the last century interested in this phenomenon of the line, art historians began their research work in the field only in the second half of the same century. Interestingly enough, Van de Velde postulated an influence of the line in nature on the artistic line, seeing these two phenomena some sort of interconnected. Only in recent times Tim Ingold brought a new component into the discourse of the line, asking for a clear separation of the line in nature and the line drawn by the artist.

Introduction

The discourse concerning line in art history, especially for the 20th century, was treated extensively by Régine Bonnefoit in her publication *Die Linientheorien von Paul Klee*[1] in a special chapter. In it, she determines that "[o]nly since 2008 [...] have the 'Linealogues' of art history and literary history"[2] acknowledged each other, but have however mainly restricted themselves to the period 1600 to 1900. Consequently, she sees her scientific investigations of line and line theory in Paul Klee's work as a supplement to the existing research. She refers to Van de Velde's

1 Régine Bonnefoit. *Die Linientheorien von Paul Klee*. Petersberg: Michael Imhof Verlag, 2009, 13–14.

2 Bonnefoit, *Linientheorien*, 14.

https://doi.org/10.1515/9783110467963-007

approach in the *Neue Deutsche Rundschau*[3], in which he provides an overview of the line from prehistoric beginnings to the current day. Bonnefoit notes that this history of style of the line by Van de Velde has to be seen under the viewpoint of "legitimation of his demands for a new, abstract ornamentation"[4] and not under those of dynamics, as I will explain in the following. In the introduction to *Diagrammatik der Architektur* (2013), a publication which also engages with the line, Dietrich Boschung, states that it was important to the editors to show "how epistemic achievement, i.e. knowledge and imaginings, are expressed in sensibly perceptible form and what their concrete forms effect once they have been created."[5] This is also the question that guided my arguments on Henry van de Velde and his postulate "a line is a force".

Albert Einstein published the famous formula $E=mc^2$ (energy equals mass times the speed of light squared) – if only in a different form – in 1905 in an appendix to his scientific article *Zur Elektrodynamic bewegter Körper*.[6] Henry van de Velde had already published his thoughts on line and specifically his postulate "a line is a force" three years earlier in the book *Kunstgewerbliche Laienpredigten*[7]. Wanting to create a direct-line relationship between Einstein's law of mass-energy-equivalence and Van de Velde's postulate of the line would be – and not just from a chronological perspective – an illusory undertaking. But if we were to look for something binding Einstein and Van de Velde, that something would be the concept of energy. Because the line identified by Van de Velde, which, according to his postulate, is a force, receives its energy from a body, or more precisely from the human body and the hand drawing the line. Or, as Frank Fehrenbach formulated it, who speaks with reference to the line of Leonardo of the "imme-

3 Henry van de Velde. Die Linie. *Die neue Rundschau* (*Neue Deutsche Rundschau*), XIX, 1908, 1035–1050.

4 Bonnefoit, *Linientheorien*, 18.

5 Dietrich Boschung. Vorwort. In *Diagrammatik der Architektur*, Dietrich Boschung and Julian Jachmann (eds.). München: Fink, 2013, 7.

6 Albert Einstein. Zur Elektrodynamik bewegter Körper (Eingegangen 30. Juni 1905). *Annalen der Physik* 17:10 (1905): 891–921; Albert Einstein. Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig? (Eingegangen 27. September 1905). *Annalen der Physik* 18:13 (1905): 639–641. The famous formula $E=mc^2$ does not appear in the main article nor in the appendix in the formulation: "Gibt ein Körper Energy L in Form von Strahlung ab, so verkleinert sich seine Masse um L/V^2", 641.

7 Henry van de Velde. *Kunstgewerbliche Laienpredigten*. Leipzig: Seemann, 1902, 188. Régine Bonnefoit noted that Van de Velde published three articles about the line, namely in 1902, 1908 and 1910, which are all entitled *Die Linie*. The article from 1902 appeared in the same year as *Kunstgewerbliche Laienpredigten*, namely on September 6th, 1902 in the German magazine *Die Zukunft*. See: Henry van de Velde. Die Linie. *Die Zukunft*, X, 40:49 (1902): 385–3. Quoted in Bonnefoit, *Linientheorien*, 18.

diate modelling forces, which are unleashed by the hand of the artist"[8]. Van de Velde's postulate is to be seen in connection with his conviction that in the near future there would be developed a scientific theory of the line, similar to that on colour by Michel Eugène Chevreul (1786–1889), which the French chemist had already presented in the first half of the nineteenth century. He published his ground-breaking insights into the theory of colour in his book *De la loi du contraste simultané des couleurs* of 1839.[9] The likely most disseminated and popular version of his theory of colour first appeared in 1864 under the title *Des couleurs et de leur application aux arts industriels à l'aide des cercles chromatiques.*[10] Along with Newton's *Optics* and Goethe's *Farbenlehre*, the work by Chevreul is considered one of the most important works on colour theory which was also known to Van de Velde.

Energy cannot be created or consumed, but certainly transformed, transported or stored. Energy is to be seen in connection with dynamics which is traditionally categorised as a sub-area of mechanics, and which can in turn be sub-divided into statics and kinetics. Statics deals with the balance of forces on non-accelerated bodies, while kinetics deals with the connection between motion and forces. This break-down is mainly applied in technical mechanics. In physics, it is common to speak of dynamics instead of kinetics. In dynamic systems, energy is assigned a clear place. If energy is stored in the system itself, it is called internal energy. Energy can, however, also be conserved in motion and is then referred to as energy of motion. Finally, energy can also be found in electromagnetic fields or gravitational fields as potential energy. For our consideration here, it is primarily internal energy and energy of motion that are relevant, whereby we can bring the latter into a direct connection with dynamics.[11]

Dynamics in the physical sense is the study of the analysis and schematisation of moving systems. When we talk about dynamics, we can't help but think

---

8 In this context we refer to Frank Fehrenbach. Veli sopra veli. Leonardo und die Schleier. In *Ikonologie des Zwischenraums. Der Schleier als Medium und Metapher,* Johannes Endres, Barbara Wittmann, Gerhard Wolf (eds.). München: Fink, 2005, 121–147, quoted in Christof Baier. "goede regel op onvolkomen oorden". Über Bewegungslinien und ihren Gebrauch in diagrammatischen Entwurfsverfahren bei Leonardo da Vinci und Simon Stevin. In *Diagrammatik der Architektur,* Dietrich Boschung and Julian Jachmann (eds.). München: Fink, 18–43, fn 19, 26.

9 Michel Eugène Chevreul. *De la loi du contraste simultané des couleurs. Et de l' assortiment des objets colorés, considéré d'après cette loi.* Paris: Pitois-Levrault, 1839.

10 Michel Eugène Chevreul. *Des couleurs et de leur application aux arts industriels à l'aide des cercles chromatiques.* Paris: J. B. Baillière et fils libraires, 1864.

11 See: Friedrich Herrmann, Gottfried Falk und Georg Job. *Karlsruher Physikkurs.* www.physikdidaktik.uni-karlsruhe.de (09.06.2015).

of Newton's three fundamental laws. The important ones to us here are Newton's second and third laws. Just a quick reminder: Newton's First Law states: "Every body perseveres in its state of rest, or of uniform motion in a right line, unless it is compelled to change that state by forces impressed thereon."[12] The Second Law or *Lex secunda* states: "The alteration of motion is ever proportional to the motive force impressed; and is made in the direction of the right line in which that force is impressed" (Fig. 1).[13] So that is the law which describes dynamic bodies as well as the third law: "To every action there is always opposed an equal reaction: or the mutual actions of two bodies upon each other are always equal, and directed in contrary parts."[14] We can conclude that dynamic, which is the study of the effect of forces, always deals with acceleration.

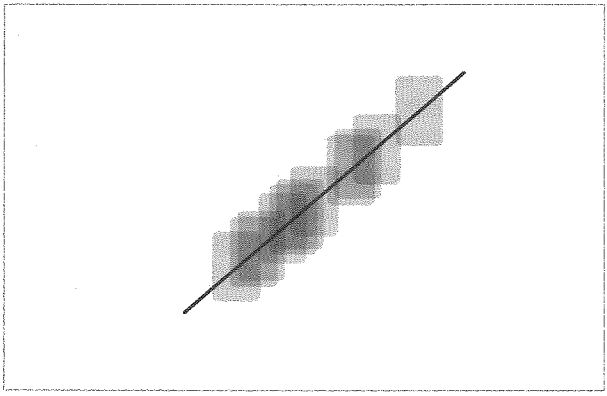

Fig. 1: "The alteration of motion is ever proportional to the motive force impressed; and is made in the direction of the right line in which that force is impressed." (Newton *Lex secunda*). In Isaac Newton, *The Mathematical Principles of Natural Philosophy*, Andrew Motte (trans.). London: Benjamin Motte, 1729, 19 (Design and © Daniela Hoesli, Zurich).

12 Isaac Newton. *The Mathematical Principles of Natural Philosophy,* Andrew Motte (trans.). London: Benjamin Motte, 1729, 19. Original version: Isaac Newton. *Philosophiae Naturalis Principia Mathematica*. Londini: Smith, Londini: Streater, 1687, 12. "Corpus omne perseverare in statu suo quiescendi vel movendi uniformiter in directum, nisi quatenus illud a viribus impressis cogitur statum suum mutare."

13 Newton, *Mathematical Principles*, 19. Original version: Newton, *Philosophiae Naturalis*, 12. "Mutationem motus proportionalem esse vi motrici impressae, et fieri secundum lineam rectam qua vis illa imprimitur."

14 Newton, *Mathematical Principles*, 20. Original version: Newton, *Philosophiae Naturalis,* 13. "Actioni contrariam semper et aequalem esse reactionem: sive corporum duorum actiones in se mutuo semper esse aequales et in partes contrarias dirigi."

Acceleration and speed became a leading topic in the nineteenth century. In some cases, it even became an obsession, like in Jules Verne's book (1828–1905) *Around the World in 80 Days*[15] where the theme is dramatized for the reader. This phenomenon is most obviously manifested in the construction of railroads –which is dealt with in various forms in Verne's book–, and locomotives whose invention in turn had its origin in the invention of the steam engine by James Watt. While France's government and business world were still sceptical of the new means of conveyance in the 1830s, the French General Staff saw this means of transportation as an instrument that coddled the troops (*efféminer les troupes*) or to translate it precisely, feminised them. The army command feared that the new means of transportation might cause the troops to lose "their ability to march long distances, which has played such a great role in the triumph of our armies" (*faire perdre cette faculté de grandes marches qui a joué un rôle si important dans le triomphe de nos armées*).[16]

Another attitude toward the railroad is seen in the writings of Michel Chevalier, a *Saint-Simonien*, that will say a follower of Henri de Saint-Simon (Claude-Henri de Rouvroy, Comte de Saint Simon, 1760–1825) and his ideas of a utopian socialism. In 1832 he published a series in the magazine *Le Globe*, entitled *Système de la Méditerranée*, in which he characterised the railroad as a symbol of universal unification (*Le chemin de fer est le symbole de l'association universelle*).[17] He sketched out not only a European but a world-wide railroad network under the keyword 'European Union' (*Confédération européenne*). But ultimately the important thing to him along with shortening travel times was shortening the gap between the various social classes. This made the railroad an instrument of democratisation and harmony among nations for Michel Chevalier. Shortening both the geographic and the social distance was the subject dealt with by Hector Berlioz in composition of 1846, *Chant des chemins de fer* (also: *Soldats de la paix*). Jules Janin's song text ascribes the railway workers the triumph and victor's laurels on the occasion of the opening of the railroad, celebrating the achievement of mountains being swept away and rivers being crossed.[18]

---

15 Jules Verne. *Le tour du monde en quatre-vingts jours*. Paris: Hetzel, 1872.

16 *Encyclopédie thématique. Sciences humaines*. 20 vol., vol. 2, Commerce extérieur – émotion. Paris: Universalis, 2005, 866 (*Naissance d'une idéologie de la salvation*).

17 Between January 20th and February 12th, 1832 Michel Chevalier, Editor-in-Chief of the journal *Le Globe* published a series of articles that were later published in book form. See: Michel Chevalier. *Système de la Méditerranée*. Paris: Bureaux du Globe, 1832.

18 Hans Christoph Worbs. *Mendelsohn Bartholdy*. Hamburg: Rowohlt Taschenbuch Verlag, 2004, 115. "C'est le grand jour, le jour de fête, Jour du triomphe et des lauriers. Pour vous, ouvriers, La couronne est prête. [...] Que de montagnes effacées ! Que de rivières traversées! Travail humain, fécondante sueur ! Quels prodiges et quel labeur!"

The topic 'speed' is still being treated in a strange way at the beginning of the last century in the corresponding reference works. In *Meyers Grosses Konversations-Lexikon* of 1909 one finds a table under the matching keyword. The first place among these "most remarkable speeds" is the snail with 1.6 mm per second.[19] At the end of the table is light-speed with 305.6 million meters per second, whereby today's value according to the international system of standards (SI) is 299.8 million meters per second lies a bit under the value named in the lexicon.

Dynamics in Pictures in the Example of Photography

Let's recall Newton's Second Law again. The *Lex secunda* states: "The alteration of motion is ever proportional to the motive force impressed; and is made in the direction of the right line in which that force is impressed."[20] In the plastic arts however the focus cannot be on measuring and documenting forces but instead on visualising them.

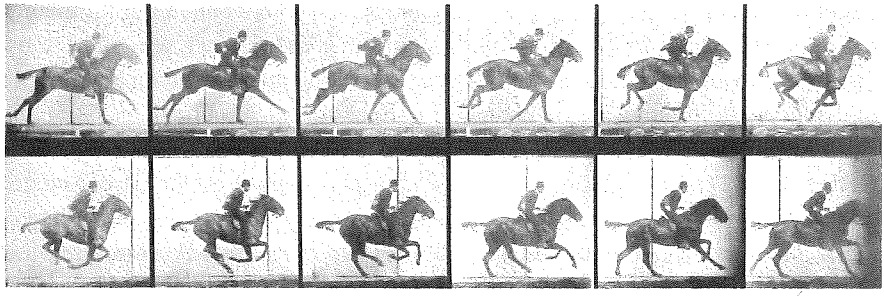

Fig. 2: Eadweard Muybridge. *Gallop; saddle; bay horse Daisy*, photogravure. In Eadweard Muybridge. *Animal Locomotion. An Electro-Photographic Investigation of Consecutive Phases of Animal Movements, 1872–1885*, vol. 9, Philadelphia: J.B. Lippincott Co., 1887, plate 624, 143x154 mm.

19 *Meyers Grosses Konversations-Lexikon. Ein Nachschlagewerk des allgemeinen Wissens,* 20 vol., vol. 7, Franzensbad bis Glashaus, sechste, gänzlich neubearbeitete und vermehrte Auflage. Leipzig: Bibliographisches Institut, 1902/1917, 710.

20 Newton, *Philosophiae*, 12. "Mutationem motus proportionalem esse vi motrici impressae, et fieri secundum lineam rectam qua vis illa imprimitur."

In the second half of the nineteenth century, it is photography, which is the first medium to take up this set of questions. In his book, *Photographie als Medium*[21], Rudolf Krauss characterises these processes inside the history of photography as the second conceptual shock. The first conceptual shock, it should be noted, would have been the invention of photography itself. There are many examples for the desire to visualise motion in space. First and foremost among those to be mentioned is the Anglo-American photographer Eadweard Muybridge (1830–1904), who gained fame from his studies of human and animal motion. In 1878, he succeeded –after various preliminary studies– to record the sequence of a horse's movements in a series of photographs for the first time (Fig. 2).[22] These phase or sequence pictures led to the insight that, "for centuries, all painters of horses and battles had been mistaken when they painted the front legs stretched far forward, the rear legs far to the back". In reality, "all four legs [...] are in the air for a fraction of a second and then the front and rear legs are under the horse's abdomen." (Fig. 3).[23]

The French scholar Étienne-Jules Marey (1830–1904) went one step further in researching the sequences of motion in animals, recording the three-dimensionality of birdflight in three projections and then creating the bronze model for the successive motions of a flying seagull (Figs. 4 and 5).[24]

---

21 Rolf H. Krauss. *Photographie als Medium. 10 Thesen zur konventionellen und konzeptuellen Photographie*, Ostfildern: Cantz, 1995, 46–48.

22 Eadweard Muybridge. *Animal Locomotion. An Electrophotographic Investigation of Consecutive Phase of Animal Movements, 1872–1885*, 4 vol. Philadelphia: University of Pennsylvania, 1887; Eadweard Muybridge. *Animals in Motion*, London: Chapman & Hall, 1899; Eadweard Muybridge. *The Human Figure in Motion. An Electro-Photographic Investigation of Consecutive Phases of Muscular Actions*, commenced 1872, completed 1885. London: Chapman & Hall, 1901. Additional literature: Wolfgang Baier. *Quellendarstellungen zur Geschichte der Fotografie*. Leipzig: VEB Fotokinoverlag, 1966; Kevin MacDonnel. *Der Mann, der die Bilder laufen liess oder Eadweard Muybridge und die 25000 (fünfundzwanzigtausend) Dollarwette*. Luzern, Frankfurt a.M.: Bucher 1973; *Eadweard Muybridge*, Ex. cat. 21.10.–28.11.1976, Württemberg, Kunstverein, Stuttgart 10.12. 1976–16.1.1977, Kunstgewerbemuseum, Zürich 29.1.–27.2.1977, Museum Bochum 5.3.–3.4.1977, Kunsthalle Basel 12.4.–28.5.1977, Kulturhaus Graz, Württembergischer Kunstverein (ed.). Stuttgart, 1976; *Sprung in die Zeit. Bewegung und Zeit als Gestaltungsprinzipien in der Photographie von den Anfängen bis zur Gegenwart*. Ex. cat. Berlinische Galerie, Museum für Moderne Kunst, Photographie und Architektur, Martin-Gropius-Bau, Berlin, 20.11.1992–17.1.1993, with contributions by Hubertus von Amelunxen et al., Berlinische Galerie (ed.). Berlin: Ars Nicolai, 1992.

23 Krauss, *Photographie*, 47.

24 Étienne-Jules Marey. *Le Vol des Oiseaux. Physiologie du mouvement*. Paris: Masson, 1890; Étienne-Jules Marey. *La Chronophotographie*. Paris: Gauthier-Villlars, 1899; Louis Gastine. *La Chronophotographie sur plaque fixe et sur pellicule mobile*. Paris: Gauthier-Villars, 1897.

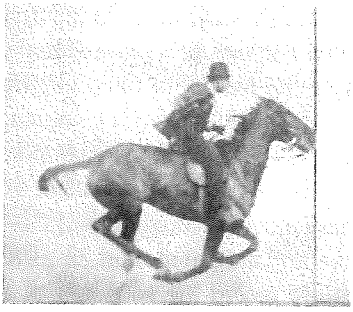

Fig. 3: Eadweard Muybridge. *Gallop; saddle; bay horse Daisy* (Detail), photogravure. In Eadweard Muybridge. *Animal Locomotion. An Electro-Photographic Investigation of Consecutive Phases of Animal Movements, 1872–1885*, vol. 9, Philadelphia: J.B. Lippincott Co., 1887, plate 624, 154x143 mm.

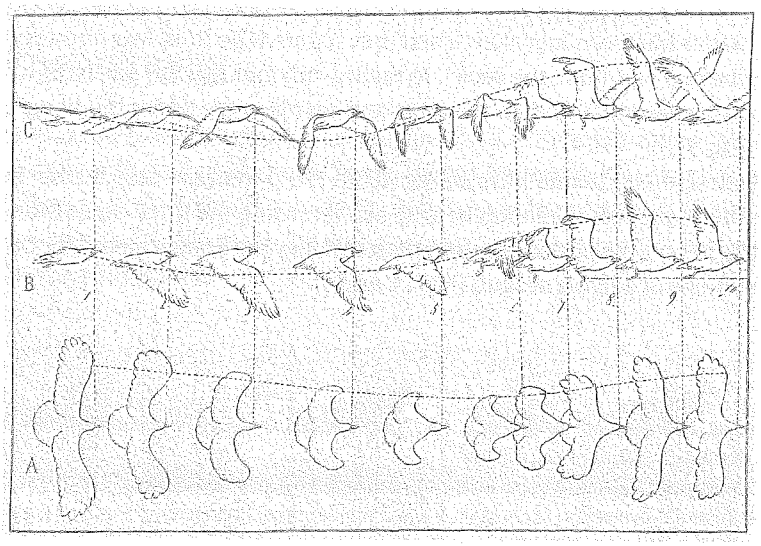

Fig. 4: Étienne-Jules Marey. *Tableau synoptique des attitudes successives d'un Goéland au vol projetées sur trois plans différents.* In Étienne-Jules Marey. *Le Vol des Oiseaux. Physiologie du mouvement*, Paris: Masson, 1890, 173, fig. 102, 112x161 mm (ETH-Bibliothek Zürich, Alte und Seltene Drucke, © ETH-Bibliothek Zürich, Alte und Seltene Drucke).

But the ones who made these motion studies were not artists, but photographers and scientists. Marey was a scientist, Muybridge a photographer, who however worked according to scientific criteria. With respect to their work, Rudolf Krauss concluded that "such conceptional shocks generate their high-quality aesthetic results automatically" (Fig. 6).[25]

25 Krauss, *Photographie*, 48.

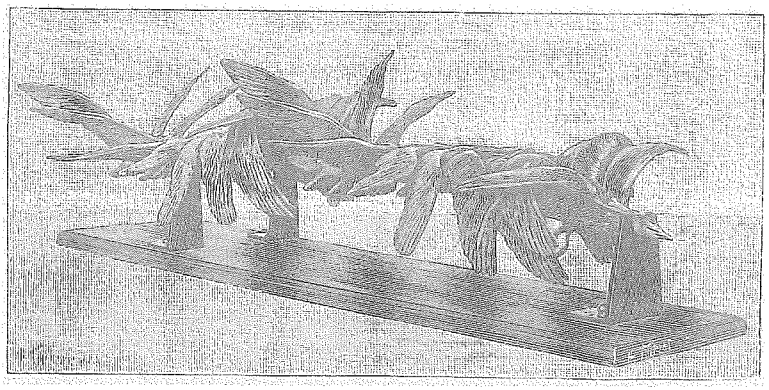

Fig. 5: Étienne-Jules Marey. *Série de figures en relief s'entrepénétrant afin de représenter les positions réelles du Goéland dans l'espace, à des instants très rapprochés d'un coup d'aile.* In Étienne-Jules Marey. *Le Vol des Oiseaux. Physiologie du mouvement.* Paris: Masson, 1890, 177, fig. 104, 49x100 mm (ETH-Bibliothek Zürich, Alte und Seltene Drucke, © ETH-Bibliothek Zürich, Alte und Seltene Drucke).

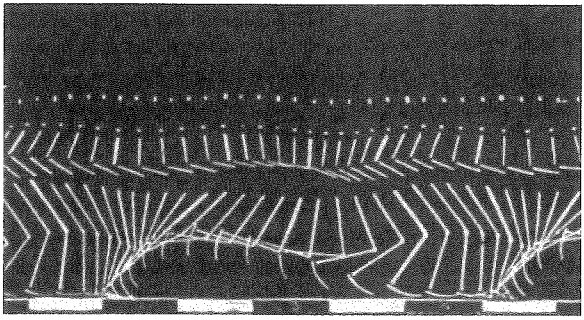

Fig. 6: Étienne-Jules Marey. *Images d'un coureur réduit à des lignes brillantes qui représentent l'attitude de ses membres (Chronophotographie géométrique).* In: Étienne-Jules Marey. *Le Mouvement.* Paris: Masson, 1894, 61, fig. 44, c. 49x100 mm (ETH-Bibliothek Zürich, Alte und Seltene Drucke, © ETH-Bibliothek Zürich, Alte und Seltene Drucke).

The photographic studies of motion had direct consequences for painting. The Futurists – especially under the Aegis of the writer and art theorist Filippo Tommaso Marinetti – like Umberto Boccioni, Giacomo Balla, Gino Severini, Carlo Carrà and others, were influenced by them in their artistic work (Fig. 7). Without directly referring to the works of Muybridge and Marey, the reception of these motion studies is seen in their manifestos and in their painting. In the manifesto from April 11th, 1910, entitled, *Futurist Painting. A Technical Manifesto* it states:

> Everything moves, everything flows, everything is completed with the greatest possible speed. A figure is never standing motionless in front of us, but instead it constantly appears and disappears. Through the image remaining on the retina, the things in motion are multiplied, change their form and follow each other like vibrations in space. A galloping horse does not have four legs, but twenty, and their motions are triangular.[26]

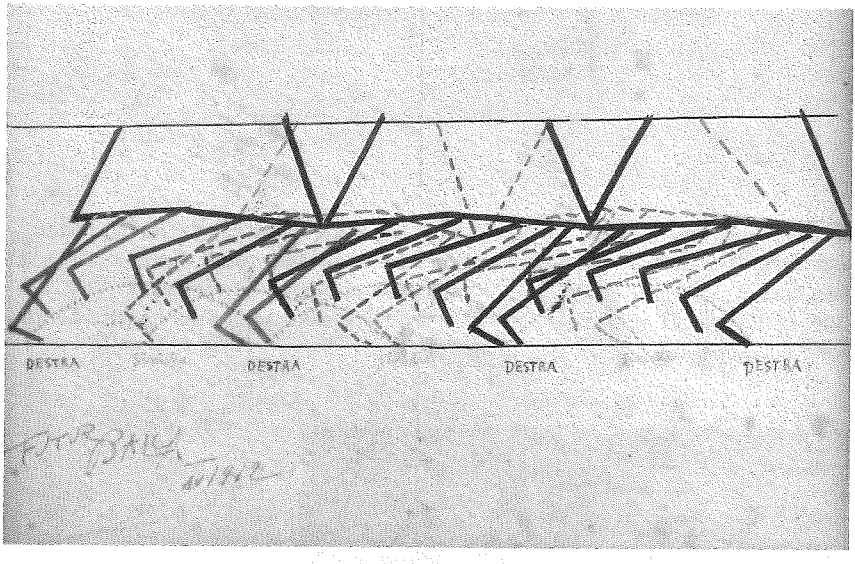

Fig. 7: Giacomo Balla. *Bambina che corre sul balcone – studio,* 1912, ink on paper, 170x245 mm (Collection Galleria Civica d'Arte Moderna, Milan © Galleria Civica d'Arte Moderna, Milan).

The motion studies of Étienne-Jules Marey and Eadweard Muybridge did not just influence the artistic work of the Futurists, but also that of Marcel Duchamp. His *Nu, descendant un escalier* of 1912 is generally seen as a synthesis of Cubism and Futurism Duchamp himself denied a direct influence from Futurist painting.

In 1913, Carlo Carrà wrote in *Pittura dei suoni, rumori e odori* of "arcs of the ellipse that are viewed, as straight lines in motion."[27] A study from the same year

---

26 Christa Baumgarth. *Geschichte des Futurismus.* Reinbek b. Hamburg: Rowohlt, 1966, 181. Giacomo Balla could have seen the works of Marey in 1888, exhibited at the Primo Congresso Fotografico in Turin. See: Flavio Fergonzi. Opere dell'avanguardia italiana nella collezione Mattioli. 2. Giocomo Balla. In Prospettiva, no. 103/104 (Luglio–Ottobre 2001), 77–96, 77.

27 Carlo D. Carrà. Die Malerei der Töne, Geräusche und Gerüche. In Baumgarth, *Geschichte,* 186. Original text: Carlo Carrà. Pittura di suoni, rumori e odori, 11 agosto 1913. Milano: Direzione del Movivento futurista, 1913.

by Giacomo Balla on *The Materiality of Light + Speed* shows how the Futurists translate speed into the picture space (Fig. 8).[28] In 1915, Balla formulated this in a written communication, saying that he had created "more than twenty paintings" in which he "studies the speed of automobiles and thereby discovered the laws and the most important lines of force in speed."[29]

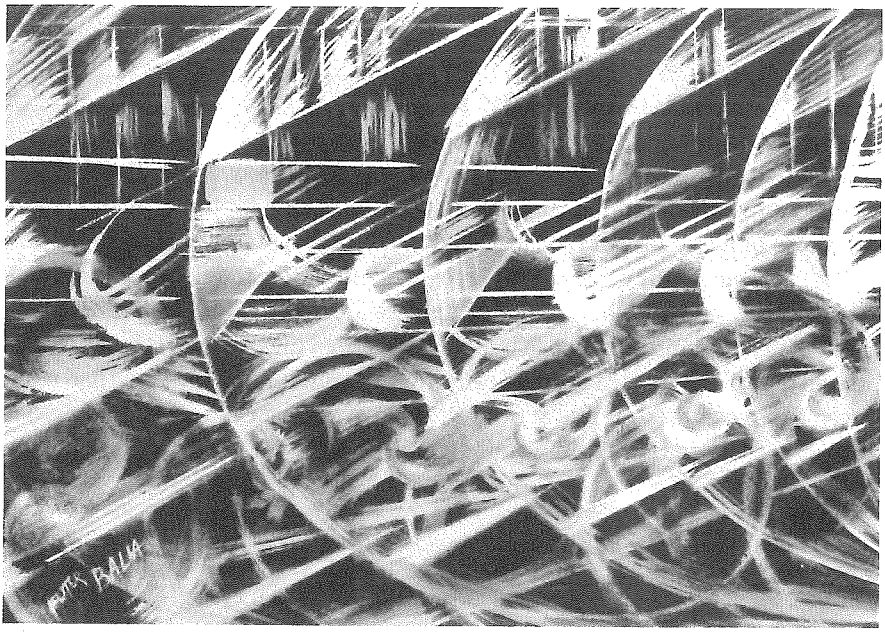

Fig. 8: Giacomo Balla, *Studio per materialità di luci + velocità*, 1913, gouache on paper, 298x432 mm (former Collection Winston Malbin, New York © Dr. and Mrs. Barnett Malbin, Birmingham, Mich.).

With these lines of force – and we are taking up Ballas' term here – we are seeing mainly circle segment lines that repeat five times and are rounded to the left. To these are added lines approaching each other horizontally that appear as bundled, straight horizontal lines in the middle in the picture space as well as lines from

28 Giacomo Balla. *Study Related to "Abstract Velocity"; Study for "Materiality of Light + Speed"*, 1913, Gouache on paper, 11 ¾ x 17 in. The Solomon R. Guggenheim Museum, New York. Published in: *Futurism. A Modern Focus. The Lydia and Harry Lewis Winston Collection*, Barnett Malbin (ed.). New York: The Solomon R. Guggenheim Museum, 1973, 49.
29 Quoted after: *Futurism*, 49.

bottom left to top. Of these three types of lines it is however the arcing lines that appear as the dynamic elements in the picture. This is certainly in harmony with Newton's Second Law that states that the motion along a curved pathway is always an accelerated motion. (Fig. 9) This is also the sense in which Carlo Carrà's assertions are interpreted that "the arcs of the ellipse are to be seen as straight lines in motion."[30]

Dynamics through Line in Decorative Art

Adding dynamism to the image space in the plastic arts under the influence of photographic and scientific studies of motion is unique for this medium. These processes however cannot be transferred to decorative art and design. If we pick up on the sequentially arranged circle segment lines from the sketch for *Materiality of Light + Speed* of Giacomo Balla[31] and the arc of the ellipse by Carlo Carrà[32], this will make it quite possible to build a bridge from the plastic arts to decorative art and design. Because in the field of decorative art Henry van de Velde had referenced the dynamic of the line at the beginning of the last century. In his *Principle Declarations* he defines the line under Point 34:

> A line is a force which like all elemental forces, is active; several lines that are connected but are working against each other effect the same thing as several elemental forces working against each other. This truth is decisive, it is the basis for the new ornamentation, but not its only principle. [...] If I were to say that a line is a force I am only asserting something factual; it draws its power from the energy of the person who drew it. This force and this energy have an effect on the mechanism of the eye so that they force it – the eye – in certain directions. These directions supplement each other, melt into each other and ultimately create specific forms. Nothing is lost, neither of the energy nor of the force, and so his ornament designed so, according to the effects of elemental forces on each other, achieves this unalterable and pure design of a deduction and preserves its force and effect permanently.[33]

Henry van de Velde speaks with respect to the line not of a direction but of directions, which leads to the conclusion that this is not to be a straight line, but must be a curving line. But certainty only appears in Point 37 of his *Principle Declara-*

30 Carrà, Malerei, 186.
31 Balla, *Abstract Velocity; Materiality of Light + Speed*. See fn 28.
32 Carrà, Malerei, 186.
33 Van de Velde, *Laienpredigten*, 188–189.

tions, where he speaks of a *curve* instead of a line.[34] If we analyse Van de Velde's principles we discover that, while he does speak of line and force, he identifies it with a curved line. The force of a line, according to Van de Velde, does not just have an effect itself, but has an effect on all other lines assigned to it. Point 37 of his *Principle Declarations* states: "He who is leavened by these laws and the influence of the lines on each other cannot feel impartial. As soon as he has drawn a *curve* [cursive by the author], the one that he places opposite it can no longer free itself from the concept that is embedded in every part of the first one; the second for its part also has an effect on that one [...]."[35] Even Newton's *Lex tertia* postulated this mutual influence and stated: "To every action there is always opposed an equal reaction: or the mutual actions of two bodies upon each other are always equal, and directed in contrary parts."[36]

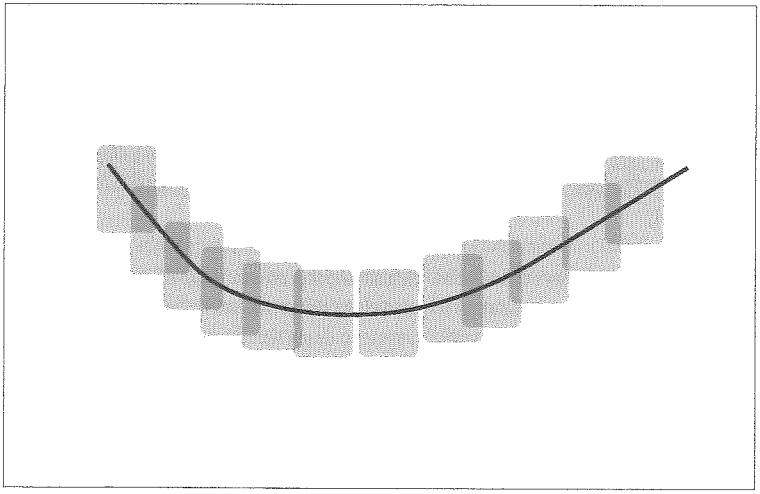

Fig. 9: The motion along a curved pathway is always an accelerated motion (Design and © Daniela Hoesli, Zürich).

Even in this second case we must note that the physical laws are interpreted by Van de Velde so that he is abstracting from the body and transfers its force to the line. According to Van de Velde, if there are two lines, the forces that work on them are mutual as is the case with bodies in Newton's Third Law.

34 Van de Velde, *Laienpredigten*, 191.
35 Van de Velde, *Laienpredigten*, 189.
36 Newton, *The mathematical principles*, 19. Original version: Newton, *Philosophiae*, 13.

With respect to the line or *curve*, Van de Velde postulates an energy that works on the line. The line, he states, "draws its force from the energy of the one who drew them."[37] In harmony with the physical laws Van de Velde assumes an energy of which none is lost and which is transferred by the artist to the ornament, who lends it "continuing force and effect"[38]. In his *Principal Declarations*, which he, in part – we can infer – based on the physical laws, Van de Velde neglected mass. The line that is drawn by the virtual body on the surface or in space, he connects it directly with the artist's hand.

The definitions of the line as force in the *Principle Declarations* cannot be harmonised with physical laws. The Belgian artist was aware of it. In Point 33 of his *Principle Declarations* he draws analogy between colour theory and the theory of the line: "Today, every painter must know that each brush stroke of paint influences the next, according to the specific laws of opposition and mutual complementarity; he must know that he cannot just treat it freely and arbitrarily. I am convinced that we will soon have a scientific theory of lines and forms".[39]

Even if we know that Van de Velde sought the scientific bases for his line theory, and did so by referring to the colour theory of Michel Eugène Chevreul, he found the inspiration for his thoughts on the line and lines in his artistic work in nature itself (Fig. 10).

> Impenetrable fog almost always ruled. The uninterrupted murmuring of the sea; only on days with frost did the sea spread out in a quiet splendour. On such days I went down to the beach with my drawing pad and pastel crayons to draw the linear Arabesques that the retreating waves left etched in the sand. In the dunes near Knokke I had already been fascinated by similar formations: transient, idiosyncratic, refined ornaments that the wind drew in the sand. Even when I had given up painting, the demon of the line did not leave me and when I created the first ornaments, they arose form the dynamic play of their elemental forces.[40]

Since Van de Velde at this point does not provide any additional description of the lines that the wind or the waves draw in the sand, I would like connect them with the "meshwork" evoked by Tim Ingold. The lines he describes that

37 Van de Velde, *Laienpredigten*, 189.

38 Van de Velde, *Laienpredigten*, 189.

39 Van de Velde, *Laienpredigten*, 188. At this point Van de Velde refers quite clearly to Chevreul. See: Chevreul, *Couleurs*.

40 Henry van de Velde. *Geschichte meines Lebens*. München: Piper, 1962, 67–68. www.dbnl.org/tekst/veld006gesc01_01/ (31.10.2016).

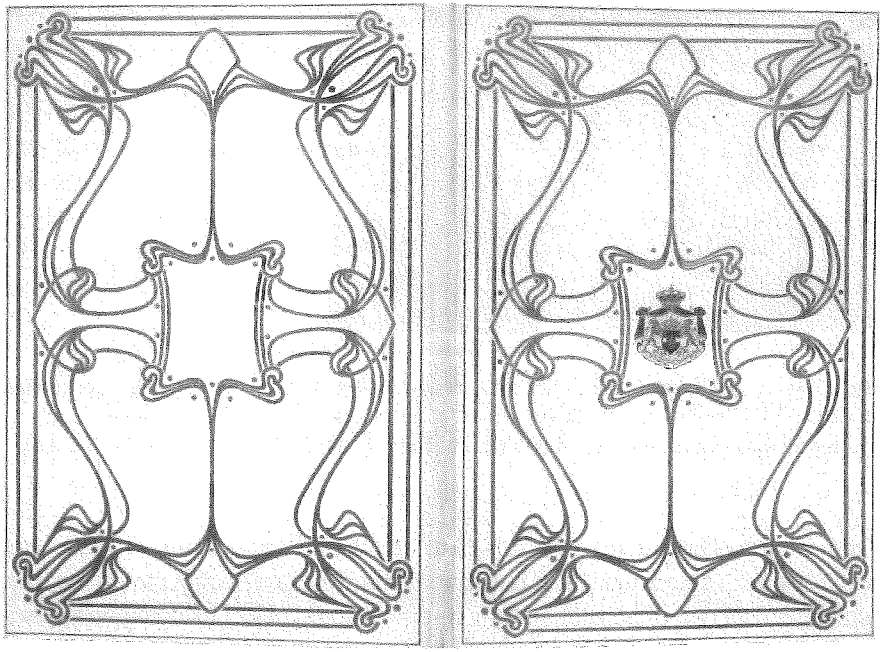

Fig. 10: Henry van de Velde. Book cover for *État Indépendant du Congo*, c. 1888, calfskin with gold embossing, 259x380 mm, Bibliotheca Wittockiana, Brussels (Fonds Michel Wittock, Fondation Roi Baudouin © Bibliotheca Wittockiana, Bruxelles).

form the *meshwork*, are drawn by snails on the earth after the rain, whereby an analogy can be identified to Van de Velde's sand lines:

> The beautiful tracery of slime trails on the flagstones comprises what I call a meshwork. By this I mean an entanglement of interwoven lines. These lines may look or twist around one another, or weave in and out. Crucially, however, they do not connect. This is what distinguishes the meshwork from the network.[41]

It was this *meshwork* formed by the waves that stimulated Van de Velde's creativity and caused him to draw his own lines as is made clear based on the *Engelwache* and as he narrates this in *Geschichte meines Lebens* (Fig. 11).[42]

41 Tim Ingold. Looking for Lines in Nature. *EarthLines. The Culture of Nature*, 11 (2012): 48–51, here 48.

42 Van de Velde, *Geschichte meines Lebens*, 64–68.

Fig. 11: Henry van de Velde. *Die Engelwache*, design 1892, c. 1893, textile hanging, applications in woolen cloth, embroidery in silk yarn, 140x233 cm (Museum für Gestaltung Zürich, Kunstgewerbesammlung; Photo: Museum für Gestaltung Zürich, FX.Jaggy /U.Romito © ZHdK).

From what has been said so far, it is clear that the idea of dynamic in design has also to do with aerodynamics. It is essentially the line, and in fact the curved line, which lends a two-dimensional or three-dimensional object its dynamic appearance even if it is a static one.

One of the most impressive examples of a visual dynamising in the area of decorative art is the design for a wall hanging by Hermann Obrist (Fig. 12). In 1892 he had founded a studio for embroidery in Florence, but moved to Munich only three years later. In 1895 he conceived the embroidery work *Zyklame* (cyclamen), better

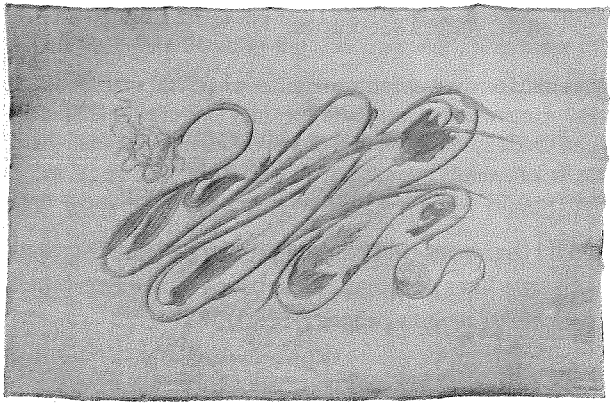

Fig. 12: Hermann Obrist. *Wandbehang mit Alpenveilchen ("Peitschenhieb")*, c. 1895, satin stitch on woollen cloth, realisation by Berthe Ruchet, 1195x1825 mm (Münchner Stadtmuseum, Munich © Scan SIK-ISEA, Zürich, Inv.-Nr. 82563).

known under the title *Der Peitschenhieb* (whiplash). The line carried out in two dimensions leads the viewer's gaze and causes him to think about the spiritual energy that was the origin of this line. Thanks to this power of imagination, the viewer comes to the conclusion that the line, which owes its existence to human *ingenium* and the hand drawing and stitching it, is a dynamic line. Hermann Obrist himself however spoke of neither force nor dynamics, but vibration. He drew the inspiration for his drafts as he said himself, "from what is vibrating everywhere"[43]. Obrist however is speaking of, unlike Van de Velde, not of a force that is in the line or, generally speaking, that is transmitted into the work of art, but of a sensation:

> Art is, from the standpoint of the producing artist, the transmission of a natural sensation, which he feels more strongly and as more detached from incidentals than regular people do [...]. For the artist, then art is giving amplified sensations [...] and for the consuming layman [...] it is empathising with the amplified sensations so presented, with the amplified life of the artist.[44]

The dynamic line on the three-dimensional object

If a line is a force, as postulated by Henry van de Velde, it is not just a dynamic line on the surface, but also in space. I would like to exemplify this thesis in four objects that all belong to the same category, namely seating furniture that have to be regarded due to their function more under considerations of statics than dynamics.

The first object is the Viennese armchair whose design is attributed to Michael Thonet and which was created around 1870 in the business of the Thonet brothers in Vienna. Standing on solid legs that sweep slightly outward and equipped with a large seat surface, the chair at first glance does not betray any trace of dynamism but is mainly an example of serene stasis (Fig. 13). Even the arch of the back, which ends in the chair's two back legs, does not betray a hint of dynamism. Only the rounded arm rests, which are set at seat height and are formed in one piece starting from the back chair legs and going forward in an upward U-shape

43 Hermann Obrist. Ein glückliches Leben. Eine Biographie des Künstlers, Forschers und Alleingängers Hermann Obrist, Manuskript, 1926/1927, 27, München, Staatliche Graphische Sammlungen. Quoted after: Bernd Apke. 'Gehe hin and bilde dieses!' Die Bedeutung der Visionen Hermann Obrists für sein künstlerisches Werk. In *Okkultismus and Avantgarde. Von Munch bis Mondrian 1900 – 1915.* Kat. Ausst. Schirn Kunsthalle. Ostfildern: Ed. Tertium, 1995, 687.

44 Hermann Obrist. Wozu über Kunst schreiben? (1. Niederschrift: Dezember 1899). *Dekorative Kunst. Illustrierte Zeitschrift für angewandte Kunst*, 3 (February 5th, 1900): 169–195, here 189–190. Quoted after: Apke, Gehe hin, 687–688.

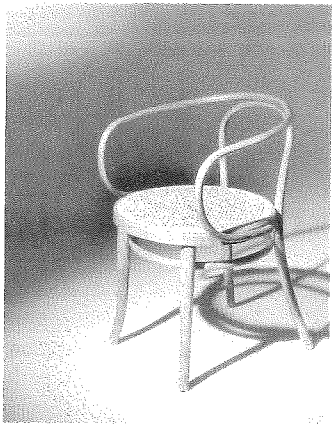

Fig. 13: Attributed to Michael Thonet. *Arm Chair No. 9 (Le Corbusier Chair)*, c. 1870, beech-bentwood, cane work, H 740 mm, Mfr. by Gebrüder Thonet, Vienna (Photo: Helge Mundt, Berlin © Kunstgewerbemuseum, Staatliche Museen zu Berlin).

that reach then to the vertex of the back arch, conveys the armchair a dynamism by bringing together the arm rests and the back rest, which keeps the human body in an upright posture. The force of the line that clearly manifests here originates in the production process of the Thonet brothers. The wooden staves were softened in steam and brought into the desired position for using a strap and then stretched into moulded parts. In Vienna, this process was first used in the period between 1843 and 1846 in the furnishings of Palais Lichtenstein.

In the writing desk chair by Henry van de Velde, 1899 which was made by Van de Velde's firm in Berlin for the Munich Art Exhibition of the same year, it is not one line that renders the design dynamic, but several (Fig. 14). The four straight legs of the chair bend slightly outward. The back rest is rounded, as in the Thonet-armchair but is closed, not open. If we are looking for lines of force in this design, they are the struts which lead left and right in a slight arc from the lower part of the back leg to underneath the seat to the front leg. Connected to both the back leg and the front leg of the chair, this arch seems to actively keep the chair's legs from buckling. The second line in this design that gets attention is that of the slightly curved arm rests that can hardly perform their function in this steep construction. In fact and truth they are an extension of the front leg of the chair, and this second arc optically enhances the dynamic of the arching leg struts. According to Barbara Mundt, Henry van de Velde used this and other designs to develop "the motif of the energetic line of force. It brings out the form and structure of the furniture and at the same time its decorative quality."[45]

45 Barbara Mundt. *Produkt-Design 1900 bis 1990. Eine Einführung.* Sammlungskatalog Neue Sammlung im Kunstgewerbemuseum Berlin. Berlin: D. Reimer, 1991, 40.

Fig. 14: Henry van de Velde. *Desk Chair*, 1899, oak, green leather, H 770/480 mm, Mfr. by H. Van de Velde, Berlin (Photo: Arne Psille, Berlin © Kunstgewerbemuseum, Staatliche Museen zu Berlin).

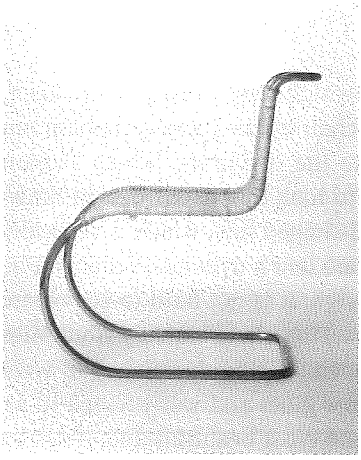

Fig. 15: Ludwig Mies van der Rohe. *MR Chair*, 1927, steel tube (rusted through old nickel coating removed, meshwork renewed), H 780/420 mm, Mfr. by Berliner Metallgewerbe Joseph Müller (1927–30), Bamberg Metallwerkstätten (as "MR 10", 1931) or Thonet (as "MR 533", after 1932), first exhibited at the *Bau- und Musterwohnungsausstellung* at the Weissenhof in Stuttgart, organized by the Deutsche Werkbund (Photo: Saturia Linke, Berlin © Kunstgewerbemuseum, Staatliche Museen zu Berlin).

The third example is the cantilevered chair by Ludwig Mies van der Rohe (1886–1969), in which the line as a line of force is actually applied and not just optically (Fig. 15). Mies van der Rohe, architect and designer, admittedly cannot be regarded as the inventor of steel pipe furniture; this achievement goes to the Dutch Constructivist Mart Stam (1899–1986). But his chair model made of gas pipes in 1926 was not useable, as soon became obvious. Inspired by Stam's furniture, Mies van der Rohe began to construct his own steel pipe furniture in the following year. He exhibited the cantilevered chair in 1927 at the exhibition for

Construction and Showcase Apartments at Weissenhof in Stuttgart put on by the German Association of Craftsmen (*Deutscher Werkbund*). Typologically this is a cantilever chair without any back legs, a model of chair, in the opinion of art historians, "whose most ingenious solution to date was created by Ludwig Mies van der Rohe [...]."[46] His chair is made from a single piece, aside from the mesh seat. Extending forward from the square steel pipe on the back of the stand space, it curves to the seat in a semi-circular arch, then on to the back support and closes the arch going slightly above and behind the back support. The dynamic of Mies van der Rohe's design is not only an optical one, established by the semi-circular line from the stand surface to the seat surface, but it is a physical one which has its origin in the method of fabricating seating furniture. Because the steel pipe is bent cold during the production process, the chair model is springy and in this sense provides dynamic sitting.

Mies van der Rohe added other models to this cantilever chair which he exhibited in the German Pavillon at the World Exhibition in Barcelona in 1929 and produced 1930 for the Villa Tugendhat in Brünn. But the simplicity and at the same time the dynamism of the cantilever chair was not achieved again in an armchair. Mies van der Rohe also has a children's model of the cantilever produced for Villa Tugendhat.

If we take the sweeping line as the constant which gives a design dynamism, I would like to add a final example, namely the chair by the Dane Verner Panton (1926–1998), designed in 1960. To demonstrate the dynamics, which Panton thought to have realised in his design, I want to look first at his design drawings and not at the finished design. Due to the S-shaped line, which is vertically divided by a straight line, the various sketches are lent a dynamism that can be seen again in reduced form in the executed design. It is not hard to see where Verner Panton found the inspiration for his stacking chair, namely from Mies van der Rohe's cantilever chair. The first specimens of this stacking chair were made from a hardened foam reinforced with fibre glass and was pressed in an industrial form. It was also characterised as "the most beautiful and certainly also the earliest single-piece plastic chair"[47]. To keep it from collapsing on itself the material had to be used thick, which lead to the model being unwieldy and heavy. The chair only became lighter starting in 1970, when production in polyester was started. Thanks to the finer construction, the stacking chair regained a good portion of its dynamics optically (Figs. 16 and 17).

46 Mundt, *Produkt-Design*, 184.
47 Mundt, *Produkt-Design*, 184.

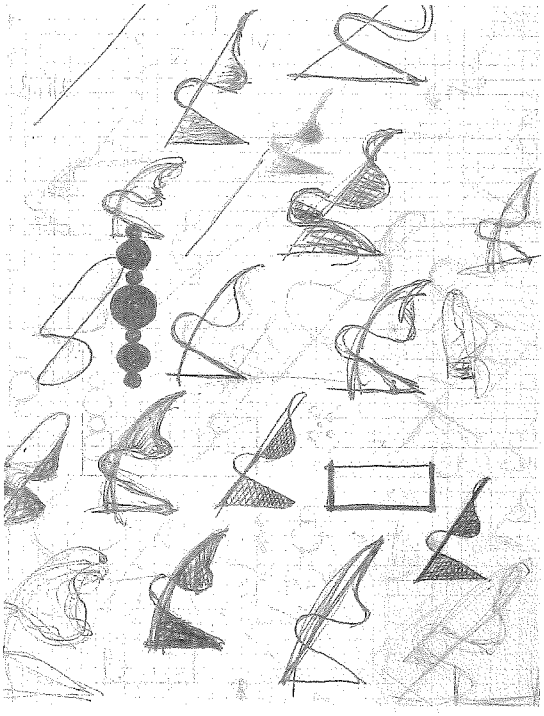

Fig. 16: Verner Panton. Study for *Panton Chair*, c. 1957–1960, mixed media on paper, 297x210 mm (Archive Vitra Design Museum, Weil am Rhein © Verner Panton Design, Basel).

One particular appreciation of Verner Panton's stacking chair, also called "Panton-chair", is the 1990 painting by Zaha Hadid *Hommage à Panton Verner*. It impressively visualises the dynamic of Panton's design (Fig. 18).

In conclusion, one can infer that the line in art can visualise actual force either on the two-dimensional surface or in three-dimensional space, but not in the sense in which it is understood in physics or physical laws, but in the sense of human energy transferred to the drawn or formed line and that the line so conveyed is perceived by the observer as being charged with energy. If it is a curved line or lines, they can effect an optical impartation of dynamics in what is represented, in certain cases however, they can also make dynamic sitting possible as in the example of the chair by Mies van der Rohe.

The line in fine arts and applied arts, we can thus conclude, is to be considered from two very different perspectives by dint of its origin. In this sense Ingold's thesis can be affirmed, when he says: "They [the lines] are impositions of the mind upon reality, he [Goya] thought, not present in one sees."[48] Composed of

48 Ingold, *Lines*, 50.

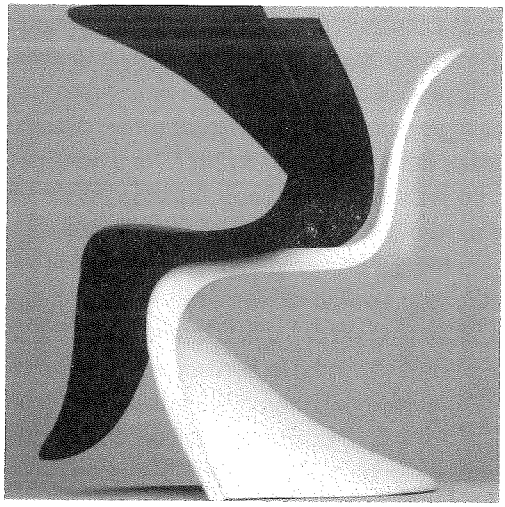

Fig. 17: Verner Panton. *Panton-Chairs*, 1999, polyurethane (hard) foam, lacquered, H 840 mm, Mfr. by Vitra (Archive Vitra Design Museum, Weil am Rhein © Archiv Vitra Design Museum, Weil am Rhein).

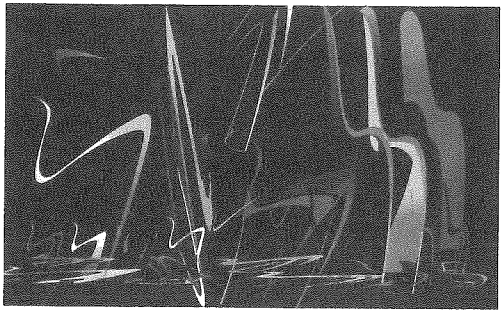

Fig. 18: Zaha Hadid. *Hommage à Panton Verner,* 1990, acryl on paper, 1150x2200 mm (Archive Vitra Design Museum, Weil am Rhein, © Zaha Hadid Architects, London).

small and the very smallest movements[49] these lines of nature, as they are called by Van de Velde, never evince the dynamic of a line drawn or formed by the hand of an artist. In order to work out the 'theory of the line' considered and demanded by the artist and theoretician Van de Velde, a strict division between the line in nature and the line produced by the artist must be made. Even if these are two essentially different phenomena, it is indisputable that the former can serve as a source of inspiration for the latter. Van de Velde's artistic work is an impressive example of it.

49 Ingold, *Lines*, 48. Speaking of slugs, Ingold writes: "Depositing their rear upon the ground, they push their front portion forwards against this posterior resistance. Then, depositing the front in its turn, they pull up at the rear, repeating the cycle over and over again in graceful slow motion. This rhythmic, push-pull cycle seems to me fundamental to the life of most if not all animate creatures, our human selves included."